

**Empowerment: Yes, it
really does work**

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**Rate your company against
the world's best**

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**How to grow your own
quality suppliers**

PAGE 107

Electronic Business

A CAHNNERS PUBLICATION

FOR THE MANAGEMENT TEAM IN ELECTRONICS, COMPUTER, AND SYSTEMS COMPANIES-WORLDWIDE

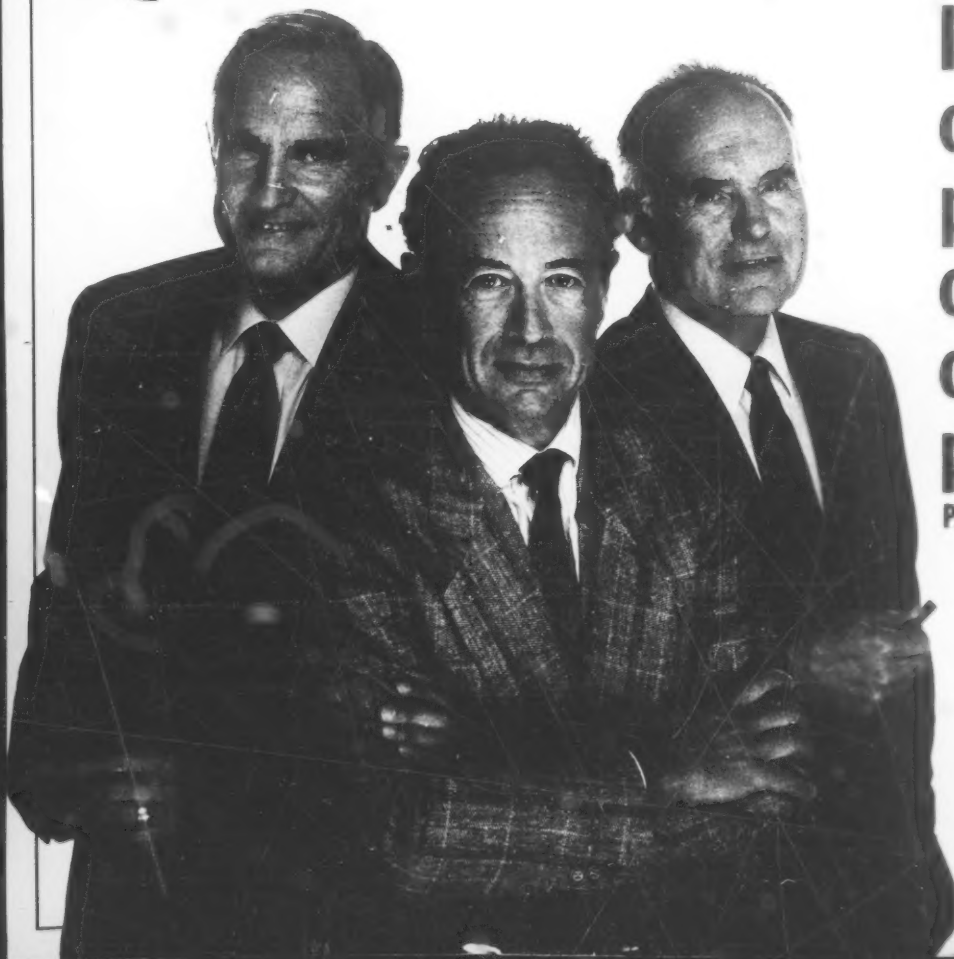
OCTOBER 7, 1991

WHAT DRIVES QUALITY AT INTEL



**It's NOT
cushy MPU
profits, but
cut-throat
commodity
pricing**

PAGE 28



**Closing in on a Baldrige
for Intel are (l. to r.)
executive VP Craig
Barrett, CEO Andrew
Grove, and chairman
Gordon Moore**

Electronic Business

FOR THE MANAGEMENT TEAM IN ELECTRONICS, COMPUTER, AND SYSTEMS COMPANIES—WORLDWIDE
VOLUME 17, NUMBER 20

OCTOBER 7, 1991

Cover photo by Christopher Springmann



By demanding the best, Intel executive VP Craig Barrett, CEO Andrew Grove, and chairman Gordon Moore have helped put Intel in the race for the Baldrige

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Intel's Embedded Control and Memory Group (ECMG), not its ubiquitous microprocessors, is leading the company's pitch for a Malcolm Baldrige National Quality Award this year. The \$1 billion business responsible for flash memory and other subsystems keeps on top of a commodity business with a relentless pursuit of the best from within Intel as well as from its suppliers, while carefully nurturing its customers

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PAGE 75 The bottom-line focus often forces quality to take a back seat with CEOs



PAGE 83 "A middle manager is not a healthy thing to be these days," says David Chen, VP of Mentor Graphics



PAGE 96 Norm Dulong and his team at Eaton Corp.

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INSIDE BUSINESS

Keeping clout in the "Q" word

HAS "QUALITY" become a corporate cliché? Some people think so, and you can't blame them entirely. Even for Baldrige Award winners, the PR bonanza carries its price in endless phone queries and speech requests. For some, controversy over consultant fees has tarnished the image of America's quality movement.

Senior editor Peter Burrows, the chief architect of this third annual ELECTRONIC BUSINESS quality report, wanted to assess the quality movement by putting the question in a different way: Is the quality message reaching its most important targets—the middle managers and factory-floor workers—and is it being shared by electronics companies with their suppliers? As you'll see within these pages, the answer is a qualified "Yes." Quality, once the CEO's pet project, is slowly, in some cases painfully, becoming "business as usual."

As senior editor Teri Sprackland reports, quality may even be the salvation of middle management, where the mores of a corporate culture get passed along from administration to production. Corporate culture, say the executives responding to an exclusive ELECTRONIC BUSINESS sur-

vey, is the single biggest obstacle to improved quality.

Elsewhere in this issue, executives share anecdotal evidence of a pleasantly surprising trend: Empowering nonmanagement employees reveals unsuspected managerial talent. David Webb's story about Filenet Corp. and Everest Electronic shows how quality-certification programs have become the cornerstone for a closer kind of relationship between electronics companies and their suppliers.

In evaluating a trend, it always helps to have a big-name player, and in this industry, they don't come any bigger than Intel Corp. Our West Coast managing editor Hugh Willett reports the microprocessor giant is using its hard-won quality lessons as it battles Japanese vendors for preeminence in the emerging market for flash memories.

Let's face it: Even hype has its positive side. As quality management and the Baldrige Award process grow in popularity and visibility, so does the base of available data. As a result, ELECTRONIC BUSINESS is able to improve its look at total quality with a comprehensive guide to quality resources.

—By John Parker

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QUALITY

Past Baldrige applicants begin to see their efforts pay off

IT'S BEEN A tough year for the Malcolm Baldrige National Quality Award. Small companies say applying is too expensive; consultants say it's a corporate beauty contest for attention-seeking CEOs; and everyone else wonders whether an award that can be won by a U.S. car company is even worth winning.

"It's all hype and no substance," charges one ELECTRONIC BUSINESS reader. "If Cadillac can win, then I'm not interested."

Despite the negative hype, however, a government study concludes the Baldrige process *does* pay off.

Twenty companies that scored highly on the 1988 and 1989 Baldrige applications have seen related improvement in employee relations, productivity, customer satisfaction, market share, and profitability, according to a recent General Accounting Office (GAO) report.

Operations reaped the most impressive gains. Product reliability, defect rates, order-processing, on-time delivery, lead times, inventory turns, and the cost of quality all improved by between 4% and 12% per year between 1988 and 1991 for those

companies. Employee satisfaction grew only 1.4% per year and customer satisfaction only 2.5% per year, but other numbers show that these groups may be more content than they realize. Customer complaints fell by 11.6% per year, and employee suggestions were up 16.6%. None of the indicators investigated showed a negative trend.

Many companies don't even try to quantify the impact of quality programs on financial performance. GAO findings suggest there is a definite relationship. The group's market share improved 13.7% per year between 1988 and 1991, and sales per employee rose 8.6%. Smaller gains were made in return on assets.

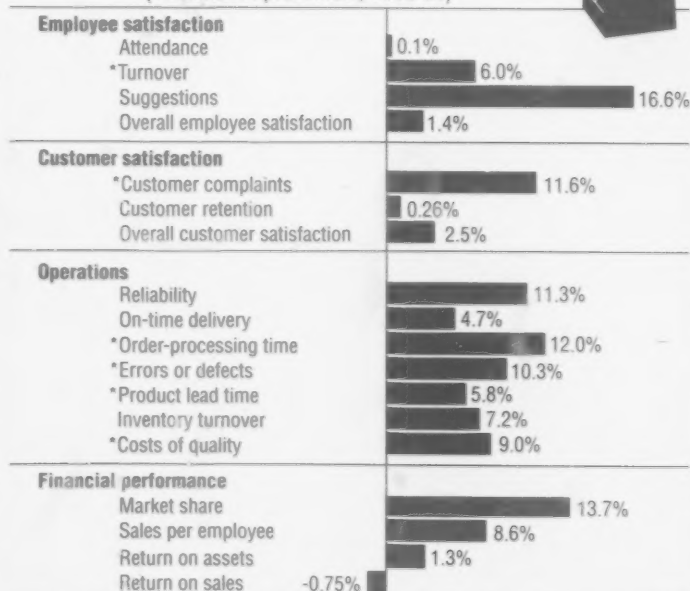
Regardless of criticism, interest in the Baldrige still is rising. Although only 106 companies applied this year, 49% of 138 companies polled by ELECTRONIC BUSINESS say they will apply in the future. Another 57% are using the Baldrige as an internal assessment tool, and some are even introducing Baldrige-based programs in their overseas operations.

—By Peter Burrows

Does Baldrige success mean business success?

A GAO study of 20 high-scoring applicants shows varying degrees of change - most of it good

(% annual improvement, 1988-91)



*Indicates reduction

Source: General Accounting Office

INVESTMENT

The quality bottom line: Act now, justify later

MILLIONS OF dollars are pumped into quality programs every year, but most electronics executives don't know how that investment affects the bottom line. Most don't even care.

"We are constantly being asked to provide proof of the link between our quality programs and profits," says Craig Walter, director of quality for Hewlett-Packard. Quality is a leading indicator of success, he explains, but profits are a lagging indicator. External factors can also affect profits. "To some extent you just have to take a leap of faith," says Walter.

More than two-thirds of 250 midsize manufacturers recently polled by Grant Thornton International, for example, say they do not

BUSINESS TRENDS

know how product and process quality affect their profitability. For some, the reason is undoubtedly lazy management not bothering to analyze their businesses. But others say the reason is an enlightened desire to implement quality programs without wasting time and money on non-value-added bean-counting.

Some companies have tried to determine their return from investing in quality. The 77 companies from the Thornton survey that did such a calculation found bottom-line savings of between 9% and 25%. (The industry rule is every \$1 saved through quality saves \$5 on the bottom line due to faster time to market, increased sales, and lower costs.)

If you are in need of a dollars-and-sense justification for your quality program, help may be on the way. A recent study by KPMG Peat Marwick lays a framework for gauging the internal processes that determine a company's quality: the way it measures customer satisfaction, empowers employees, and learns as an organization, for instance. The American Quality Foundation is developing an econometric model to measure the bottom-line impact of quality.

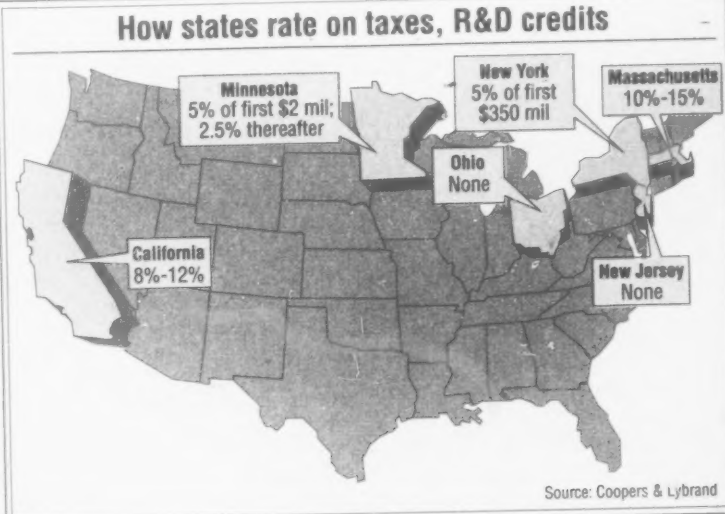
—By Peter Burrows

COMPETITIVENESS

Mass. lures business with aggressive R&D tax credit

THE COMMONWEALTH of Massachusetts, bruised and battered by the recent economic downturn, has adopted what some observers call the nation's most aggressive R&D tax credit policy to attract new, expanding, and relocating businesses.

The new law provides credits of up to 15% for those R&D expenditures that exceed the levels of the previous year and is designed to make Massachusetts "the most attractive state in the country for conducting R&D," says a spokesman for the state's Office of Economic Affairs in Boston. California, another high-tech bastion, offers an R&D tax



credit of up to 12%.

The law, retroactive to January 1, makes Massachusetts the 14th state to offer business R&D tax credits. Others include Minnesota, New York, Colorado, and West Virginia. Until now, the Bay State had offered businesses no such incentive.

The new policy offers companies a 10% tax credit on incremental increases in company-conducted R&D expenditures and a 15% credit on incremental increases in new, original research conducted by universities. While the Massachusetts bill is modeled roughly on the federal R&D tax credit law, it differs in at least two important respects: It is permanent, and companies must increase their annual R&D spending in order to realize the benefits.

Proponents of the policy hope that Bay State companies will respond to the law as California businesses did following that state's passage of its R&D tax credit law in 1987. Research in California has risen significantly since that time, notes Teresa Casazza, manager of state government relations for the American Electronics Association in Sacramento, even though overall business has been declining.

Some industry executives, moreover, consider such an incentive an

essential weapon in the states' battle for new corporate investment. "It is important that Massachusetts not be competitively disadvantaged with respect to other states," wrote Analog Devices president Ray Stata in a letter supporting passage of the bill.

Still, the issue fueled debate on the short- and long-term impact on state revenue and the overall business climate. Some groups argue there is little evidence that such incentives, in fact, pay off in more jobs or other benefits. The state Department of Revenue, however, maintains that this year's estimated \$34 million in lost business taxes will be offset at least in part by higher personal income taxes and other taxes stemming from increased R&D.

—H. Garrett DeYoung

DISK DRIVES

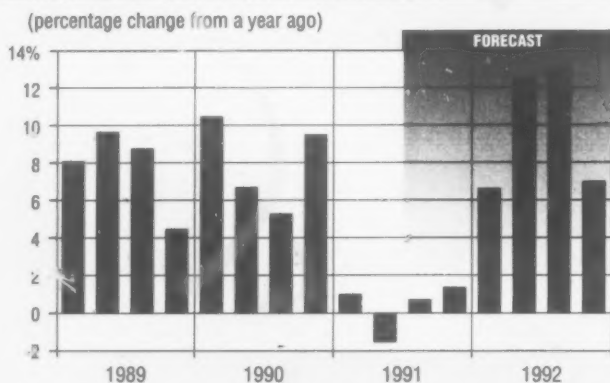
Are there blue skies ahead for disk-drive makers?

AFTER TAKING IT on the chin for the past year, relief may be in sight for disk-drive manufacturers, as new form factors begin to replace a glut of 3.5-inch drives.

But it's tough to be optimistic given the casualties of the past three

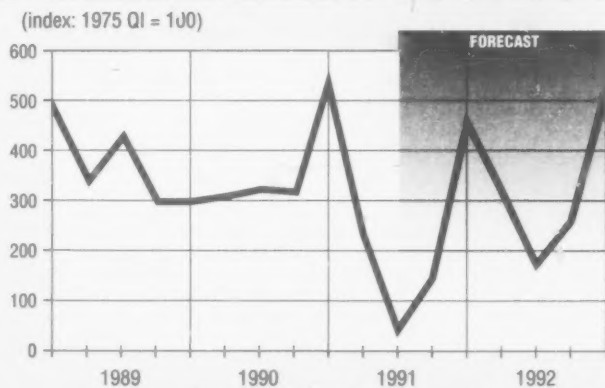
BUSINESS BAROMETER

Slumping revenue growth in '91...



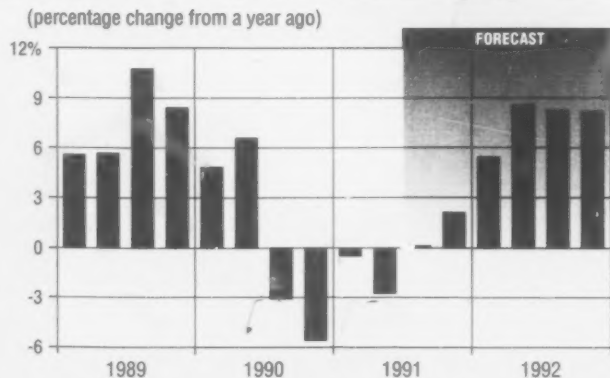
Source: ELECTRONIC BUSINESS; Forecast: Cahners Economics

...and restructuring costs force profits down...



Source: ELECTRONIC BUSINESS; Forecast: Cahners Economics

...but rising demand will bring relief in '92



Source: Commerce Department; Forecast: Cahners Economics

Restructuring costs drain profits

THE ELECTRONICS industry is in a state of flux and the cost of those changes has been massive. Several companies that ELECTRONIC BUSINESS tracks quarterly incurred such expensive restructuring charges in the second quarter of this year that the ELECTRONIC BUSINESS profits index dropped to its lowest level since the index began in 1975. The index registered an actual loss in the second quarter of 1991, the first loss ever for the ELECTRONIC BUSINESS profits index.

Digital Equipment Corp. had the largest impact on the profits index during the April-to-June quarter as a result of a \$1.1 billion restructuring charge. "The company has opted for more aggressive action in order to prepare for the rapid changes taking place in the industry," says DEC spokesman Bradley Allen. As with other companies, DEC warns of upcoming poor financial performance as restructuring costs continue into 1992.

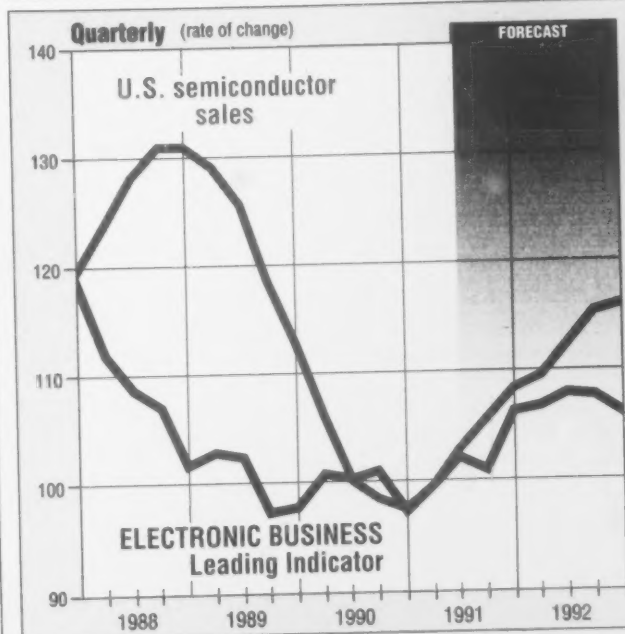
Meanwhile, electronics revenues fared poorly in the second quarter of 1991, falling 1.6% below the same quarter in 1990—the first decline since early 1986. On a brighter note, recent data on electronics orders indicate the industry may have struck bottom and the turning point back upward may now be at hand. Orders for electronics equipment and components are forecast to grow 7.7% next year.

Electronics manufacturers are using the 1991 recession as a chance to reposition themselves for the long term. Managers must now pay closer attention to their product lines, productivity, quality, and customer service in order to reap the rewards of higher profits in the future. Unfortunately, job losses are part of this transition, but the payoff will be a leaner industry waiting to greet rising demand. In 1992 annual revenues in electronics are forecast to rise 9.7%.

—John Farrell

BUSINESS BAROMETER

ELECTRONIC BUSINESS Leading Indicator

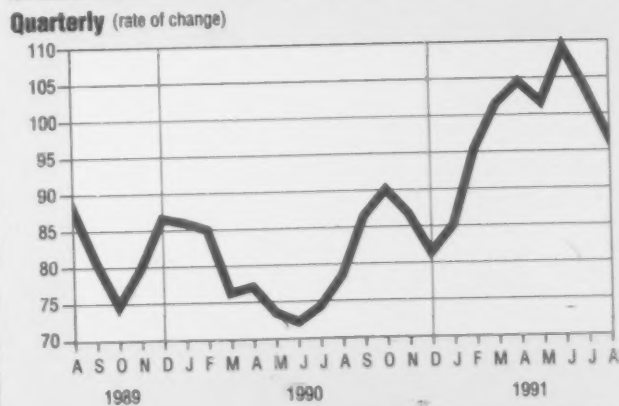


Leading Indicator stalls again in July

THE ELECTRONIC BUSINESS Leading Indicator (EBLI) fell to 99.5 in July, the third month of sluggish performance and the first month below 100 since January, and the anticipated recovery has been put on hold. Cahners Economics predicts EBLI will expand later this year and next, but the past three months' activity means the rebound will be more spotty than originally projected.

EBLI is a weighted composite of six statistics that lead activity in the electronics industry. To obtain a complimentary background paper, contact Cahners Economics, 275 Washington St., Newton, MA 02158-1630, USA; telephone (617) 630-2119; fax (617) 630-2100.

Component lead times pull back after initial surge

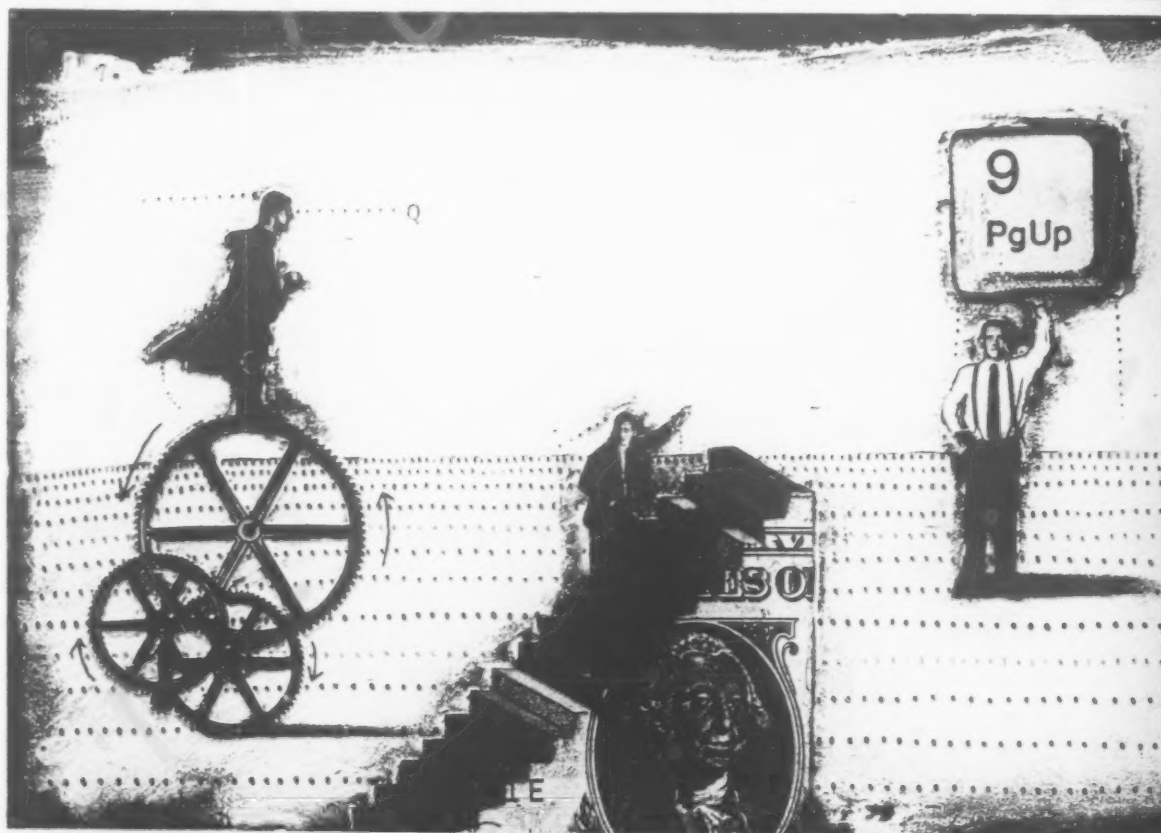


ELECTRONIC BUSINESS Leading Indicator (rate of change, July)

	Latest month	Previous month	Year ago	1990 average
ELECTRONIC BUSINESS Leading Indicator (rate of change, July)	99.5	101.8	101.3	99.9
U.S. semiconductor bookings (\$ millions, 3-month average, July)	\$1,237	\$1,313	\$1,243	\$1,254
Weekly hours of semiconductor production workers (monthly average, June)	40.9	41.2	40.5	40.4
Electronic components lead time index (1977 = 100, Aug.)	75.3	73.7	85.9	80.7
S&P's semiconductor stock price index (1970 = 10, monthly average, July)	68.3	72.2	78.2	64.6
Change in electronic components inventories (\$ millions, SA, June)	-\$21	-\$28	-\$15	\$33
Contracts and orders for plant and equipment (\$ billions, SA, June)	\$31.9	\$32.0	\$37.5	\$38.3

SA = seasonally adjusted; all other data are not seasonally adjusted

Sources: Semiconductor Industry Association, Bureau of Labor Statistics, Electronics Purchasing magazine, Standard & Poor's, Commerce Dept., Bureau of Economic Analysis, Cahners Economics



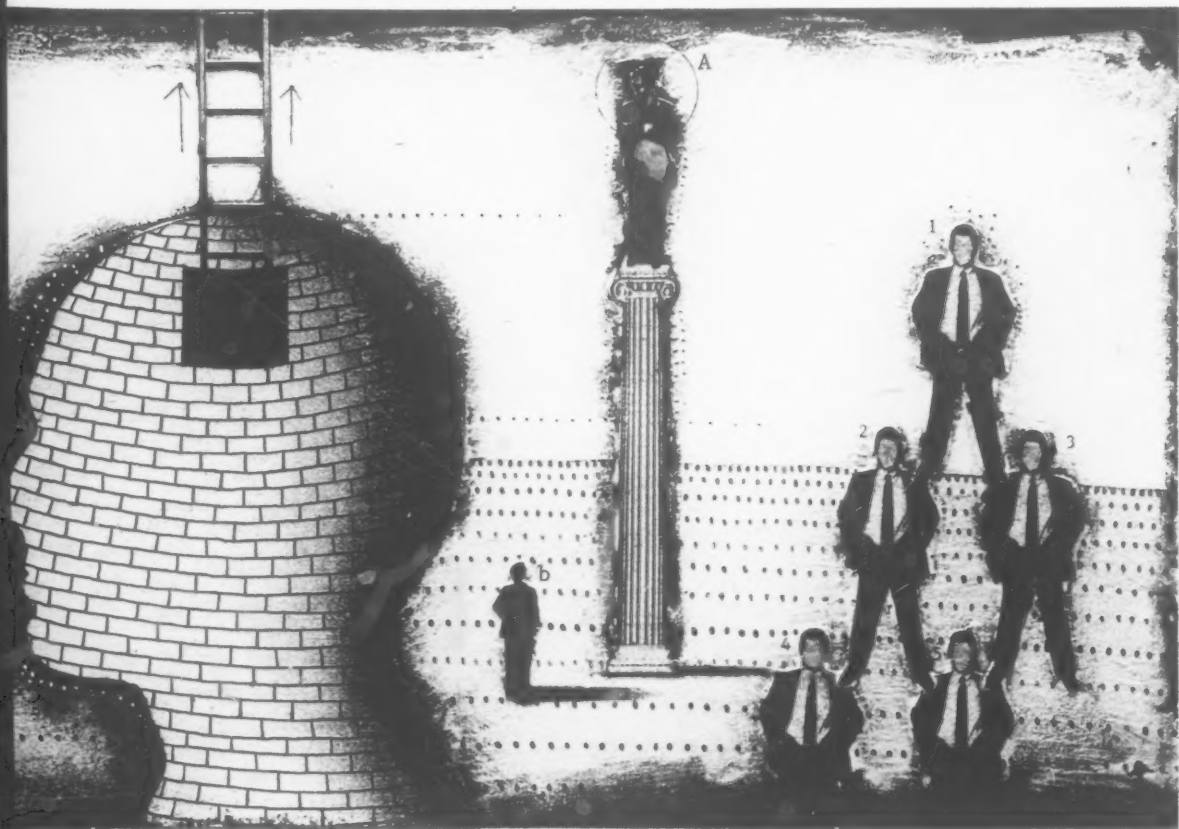
CORPORATE CULTURE

is the next

quality frontier

Sound a bit too warm and fuzzy? Maybe, but that's just what you'll need to hit the big goals of the 1990s

By Peter Burrows



David Lash

The wake-up call on quality is over. Good intentions, world-class consultants, and well-prepared strategies just aren't enough anymore. What you need now is execution.

For that you need a quality corporate culture, where information flows freely, artificial barriers are systematically dismantled, and employees are enthusiastic and satisfied in their work.

Evidence of the need for a quality culture is everywhere. Many of you are trying to use concurrent engineering to squeeze new products through shrinking market windows—but that works only after the divisional walls have come down. In order to meet your customers' demanding delivery requirements and increase productivity, some of you are moving from volume-based manufacturing plans to flexible manufacturing schemes—but that requires active participation and decision-making from employees, not the passive repetition that comes with economy-of-scale thinking.

To make your journey easier, the following series of stories looks at some recurrent problems electronics companies face as they try to build a quality culture—a Herculean task that requires dramatic change at all levels of an organization. Since quality is not just for manufacturing departments, we also include a function-by-function “quality all-star” team. Whether your interest is in human resources, purchasing, distribution, sales and marketing, or finance, you'll find

some solid ideas here:

- **Top executives** cannot just delegate quality but must learn it, live it, and invest in it, no matter what Wall Street says;
- **Engineers** must come down from the ivory towers afforded them in many U.S. companies and learn to work with others in a more integrated, cross-functional way;
- **Middle managers** must conquer very real fears for their job security and accept the role of facilitator for a newly empowered work force;
- **Employees** must overcome their cynicism and fear of added responsibility and use their front-line expertise to improve the way they do their jobs;
- **Suppliers** must meet their customers' rising quality requirements;
- **Distributors**, long a weak link in the quality chain, must mend their ways.

This is the time to take a look at the people side of your quality programs. Competitors from countries that are considered havens for open corporate cultures—Japan, Korea, Switzerland—are pressing ahead themselves. Furthermore, the experience of quality pioneers indicates that there's a larger and faster payback from empowering employees and other people programs than from capital spending initiatives.

Veterans of the quality wars say that technological quick-fixes and rejiggered organizational structures aren't as important as better nitty-gritty people manage-

THE CULTURE OF QUALITY

ment aimed at soliciting the expertise of each employee. In poll after poll, technologies like robotics and computer-integrated manufacturing get low marks as quality improvement drivers, while relatively simple measures such as "more employee involvement" and "cross-functional teams" rank at the top of CEO priority lists. "What we thought were soft issues are the ones that are turning out to be the key drivers," says Scott Flaig, national director of manufacturing and high technology for Ernst & Young in Cleveland, Ohio. In fact, "employee involvement" was cited as the single best means to improve quality by 582 chief executives polled by ELECTRONIC BUSINESS and the accounting and consulting firm Ernst & Young late last year (see table this page).

If this all sounds warm and fuzzy, don't worry. It should. The vocabulary of culture management includes terms like "psychology" and "group dynamics" rather than clean mathematical metrics like "inventory turns" or "defects per million."

In fact, an increased focus on the people part of the pursuit of excellence is a sign of the maturing of the

manufacturing assumed responsibility for installation from the service organization to better understand customer needs. The results were dramatic—the mean-time-between-failure of GCA's best-selling line of steppers went from 43 hours in 1987 to 600 hours today.

OTHER COMPANIES ARE achieving significant quality improvements by empowering employees and then decentralizing decision-making. After ordering HP to improve quality levels by a factor of 10 in the early '80s, CEO John Young now permits each division to determine its own goals in the '90s. Since the company calculates quality in defects per thousand dollars of sales, the business units decided how many dollars to spend on quality improvement versus usability, functionality, or other attributes. HP saved \$800 million in warranty costs in the '80s as the company reduced field defects by about 80% and increased manufacturing productivity by 15%.

The decentralized approach to quality management also increases the ability to quickly respond to changes in the market, industry officials note. "The world keeps changing, and the goal is to continue to stay at world-class levels," explains John Scruggs, general manager of HP's Colorado Surface Mount Center in Loveland, Colo.

Early adopters of the quality mantra also have discovered that the success of employee empowerment is based on a more realistic approach by the entire company. As a result, many companies are taking the pap and glitz out of their quality efforts. CEOs who thought that spending a lot of money to fly all their top managers to a resort for a speech by an costly consultant were disappointed that the speaker's expensive words went unheeded. Sequent Computer Systems, Eaton Corp., AVX, and other companies have dismissed outside quality consultants and replaced them with in-house managers who have the personal motivation and leverage with workers to make sure programs stick. "People had come to view quality as what the gurus say it is, and not as a business sense that can be taught and learned," says Curt Reimann, the director for the Baldrige Award program at the Department of Commerce. An AVX official puts it another way: "when an outside person is involved, he's the expert, and everyone else is absolved of responsibility."

Dumping or reducing the use of outside consultants is one of the early signs of a more mature employee-based quality campaign. Another sign is discontinuing the glamorous quality conference at a flashy resort. HP and other firms are canceling off-site training programs in favor of on-site training of employees. Increasingly, these on-site quality sessions occur on the factory floor and focus on actual problems. "Sheep-dip training" doesn't work, explains Joe Nesheim, process improvement manager at HP's Loveland division—you can't teach quality in a remote classroom.

Welcome to the real world of quality. □

The best techniques to improve quality

(Percentage of 582 CEOs rating a method as effective)

Employee involvement	76%
Improved customer communication	33
Quality-related training	26
Quality improvement teams	18
Supplier improvement activities	16
Employee cross-training	13
Statistical application	12
Automation	7

Source: "Electronics '91: Framework for the Future," survey and study by ELECTRONIC BUSINESS and Ernst & Young

quality revolution. It has evolved from a top-down dictate of senior management to a more collaborative approach. "It's time to go from the big picture approach to the little picture approach," says Peter Simone, president of fab equipment maker GCA in Andover, Mass. He speaks from painful experience—the fab equipment maker was in a death spiral until its revamped approach to people management improved the quality of the company's products and its fortunes.

An employee empowerment program that brought together different groups within the company reversed GCA's poor quality record, according to Mike Werner, vice president for manufacturing at the company. Part of the empowerment process included breaching the walls between corporate functions. Customer service and manufacturing, for example, successfully implemented a data collection system on equipment in the field. Manu-

CEOs talk a good quality game, but...

The bottom-line focus often forces quality to take a back seat within the CEO ranks

By Elizabeth B. Baatz

For too long, too many chief executives have preached a good quality sermon but have left implementation of the details to the rest of the corporate flock.

Top execs stand now where Ray Stata, chairman and CEO of Analog Devices Inc. in Norwood, Mass., stood in the early '80s. "With hindsight, the role I played was more of a cheerleader than a participant in the game," says Stata. "That is, my contribution was largely to learn a few buzzwords and slogans, to give speeches, to ask an occasional question; but mostly I delegated the responsibility for change management to others. How I performed my personal work and supervised the work of others did not change very much."

According to the 1991 productivity survey of the American Electronics Association, many senior executives have yet to fully participate in the quality improvement drive. Only 51% of the 311 companies surveyed have a corporate quality council, and only 40% of those councils are chaired by the CEO or president. These figures hardly suggest a stampede for quality from the electronics industry's top execs.

Often executives often aren't even aware of the gap between their quality rhetoric and the reality of their personal performances. Take the case of Roger D. Emerick, chairman and CEO of Fremont, Calif.-based semiconductor equipment maker Lam Research Corp. Says Emerick, "My whole philosophy as a manager from the beginning has been cus-

tomer responsiveness." But when a customer demanded quality training at Lam eight months ago, Emerick recalls his first response was, "We have a business to run."

Clearly, running the business is the main concern of the CEO. As Josh Hammond, president of the American Quality Foundation, says, "Quality is not the top concern of the CEO—profitability is."

The problem for the chief executive and his board is this: The link between a CEO's commitment to quality and the bottom-line payoff

is often difficult to discern. Cost savings from reducing product defects and other manufacturing quality programs are obvious. Linking the "unknowables"—like quality training and employee communication videotapes—to increased profits is more murky.

CONTRIBUTING TO THE problem is the fact that growing profits is a short-term goal while improving quality is a long-term objective and a long-term process. Few are willing to agree with Arthur Carr, president and chief executive of data communications vendor Bytex Corp. of Southborough, Mass., that "if your teeth can handle the grinding, then quality is more important than meeting the quarter."

The evidence: few top managers equate improved quality with greater corporate profits. Of the 138 senior executives surveyed by ELECTRONIC BUSINESS last summer, only 13% said higher profits or higher operating income are the most beneficial outcome of their companies' quality programs.

Management consulting firms and others are just now furiously building behavioral models to try to better measure the quality-profit relationship. While these models will provide more data for quality directors to trot into the corner offices, CEOs must nonetheless continue to take a leap of faith in order to become truly quality-driven leaders.

Moreover, electronics industry executives are not alone in their lack of commitment to quality. In a Gal-



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lup survey of 401 U.S. chief executive officers conducted last year, 62% said the lack of managerial attention doesn't affect quality, and 70% said pressure for short-term profits isn't a quality problem.

The Catch-22 is this: Without the whole-hearted participation of the chief executive, the company's quality program is doomed to fail. That statement has become so widely-accepted, it has almost become a mantra for the quality gurus. "The old testament was that quality is a departmental and institutional responsibility," says Robert W. Galvin, chairman of Motorola Inc. "The new truth is radically different. Quality is a personal obligation. If you can't talk with humility about quality daily in the first person, then you have not moved to the level of involvement that is absolutely necessary."

If all the surveys don't convince you there's a problem in the board room, then listen to the quality directors and quality vice presidents who chief executives have been hiring in droves. They say, more often than not, that their number-one goal is simply to persuade their CEOs to raise quality higher on management's list of priorities.

A case in point is Bob Rauch, vice president of quality at Maxtor Corp., who discovered first-hand the difference between a CEO who is committed to quality and one who isn't. His new boss, CEO and president Laurence R. Hootnick, joined the disk drive maker last May. Hootnick has since taken on the mantle of quality and has made the quality-drive his personal crusade. As a result, Rauch is no longer the top-dog of quality at Maxtor, Hootnick is.

"It's not that previous management didn't want quality," says Rauch. "It simply wasn't high on

their priority list." Now when Rauch calls someone else in the company, he gets an immediate response.

Preoccupied with short-term profit goals and beholden to Wall Street, senior executives often need a crisis to force them to jump onto the quality bandwagon. In the past decade, intense competition from Japan provided that crisis. For many U.S. electronics CEOs, the quality game became "do or die," and some succumbed.

One company caught in that struggle is Varian Associates Inc., a diversified manufacturer of semiconductor production equipment, medical instruments, and other

high-tech products. Thin profit margins since 1985 helped lead to a shake-up in Varian. As part of the internal overhaul, the \$1.3-billion company recruited a new chairman and CEO, J. Tracy O'Rourke, from Rockwell International and Allen-Bradley Co., where he'd built his

reputation as a quality-oriented leader.

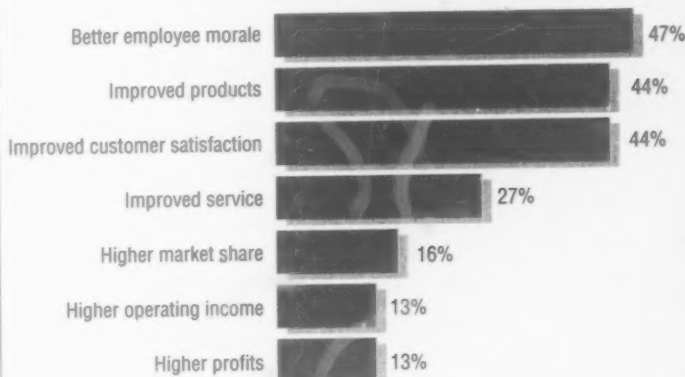
While the Palo Alto, Calif., company wasn't exactly floundering, its primary market segment—semiconductor manufacturing—was, and Varian needed to be re-invigorated. "A year ago, everything was late, from meetings to deliveries. We'd announce a product one to two years late, not one to two months late," says O'Rourke.

O'Rourke began a total quality blitz throughout the 43-year-old company. Through an intense program of sharing best practices across the company, revolution rallies, and O'Rourke's constant involvement in a new organizational excellence program, Varian's statistics have improved dramatically.

Within a year, one product group saw its cycle time halved from 55 weeks to 22, its cost of rework and scrap fall from 17% to 11%, and its market share rise from 36% to 51%. Even the corporate purchasing department has seen drastic changes; the number of pages in its monthly report was cut from 2,500 to 600. The company now plans to apply for the Baldrige National Quality Award next year.

How execs rank quality's payoff

(percentage of respondents)



Multiple responses allowed

Source: ELECTRONIC BUSINESS



"We're only doing a tenth of what we ought to do," says Amp CEO James E. Marley

The world's largest connector maker, Amp Inc. of Harrisburg, Penn., is yet another old-line company that has adapted to the new order. This 50-year-old \$3-billion blue-chip company introduced a formal quality program in the early '80s. Amp's training and development spending has risen from around \$3 million in 1986 to over \$11 million in 1990. The results clearly indicate the effort has been worth undertaking. For example, on-time shipments (zero days late and up to three days early) improved from 67% in 1987 to 91% in 1990.

Still the task of creating a quality-driven corporate culture consumes Amp's president and chief operating officer, James E. Marley. "The approach has been to communicate [with employees] three times as much. Each time I think we're doing it right, but then I realize we're only doing one-tenth of what we need to do," says Marley.

While many CEOs in the old guard stumble on the quality issue, many of them in the newer high-tech companies established a quality-driven corporate culture from the first day of operation. Chief executive Joseph R. (Rod) Canon's commitment to quality since day one at eight-year-old Compaq Computer Corp. in Houston is just one example.

Maintaining the Compaq quality culture is so important to Canon that he updates the corporate history video every year to include recent efforts to improve quality. In the video, Canon and some of its early founders and employees sit around spinning yarns about the early days. That way, stories about the time senior vice president of engineering Jim Harris tossed an early prototype PC down the hallway to test its ruggedness and about the time a junior market researcher overturned Canon's decision to jump into the laptop market are passed on to every new employee and celebrated by every veteran.

Another example of a young company's pursuit of quality from the top

Can the CEO give up veto power?

What would it take you, the CEO, to give up all veto power? That is the question Charlotte Roberts, of Innovation Associates—a consulting company specializing in organizational change in Framingham, Mass.—asks executives all the time. "You can imagine how CEOs react," says Roberts.

When a 62-year-old CEO says, "No way. I can never give up all my veto power. I'm the only one who has the knowledge to make the right decision," Roberts is armed with a stern admonishment. She says, "A 62-year learning cycle is dreadful."

Reducing cycle time is a top objective of the total quality movement and CEOs can be measured on their own cycle time too. For chief executives, the measurement is the time it takes to transfer their

knowledge base to others in the organization. "You cannot delegate this to the training and development department," says Roberts. "It's all inside the CEO's head." The major management challenge is to shorten that learning cycle. If managers do not transfer their knowledge and learn how to give up their veto power, the total quality movement will flounder within a company.

"Look at how many electronics companies are still headed by their founders," says Roberts. The problem for founders is they often think they are indispensable to the operation and are the only ones who know the company well enough to make important decisions. But if that is the way your company is being run, chances are true total quality is still missing. □

is three-year-old, privately held Quality Semiconductor Inc. Having worked at Hewlett-Packard Co. and Integrated Device Technology Inc., QSI founder Chun P. Chui had specific ideas about the kind of corporate culture he wanted to create. He deliberately designed his new headquarters in Santa Clara, Calif., with no corner office; every worker, including Chui, sits in a cubicle. The conference rooms have glass windows facing the corridor, and all 70 employees have been given partial ownership in the company.

What works for a Silicon Valley start-up may not work for an East Coast or Midwest behemoth. Still, past Baldrige Quality Award winners—Xerox, Motorola, and IBM—are proof that large companies with entrenched cultures can become nimble competitors in the quality arena.

IF YOU'RE AN EXECUTIVE who thinks you'll help your company achieve quality improvements by sending your employees back to school without cracking the books

yourself, think again. Successful quality-driven leaders emphasize their own training was as important if not more important than the re-education of the work force. Yet only 57% of chief executives and presidents polled by ELECTRONIC BUSINESS went through some kind of training last year. What about the other 43%? Fact is, a substantial number of electronics executives have yet to go back to class.

Going back to school won't help, however, if top executives don't walk away with a born-again fervor about quality. Preaching quality is definitely part of the chief executive's job, but that's the easy part.

The hard part for electronics executives is the next step: making that humble, very personal commitment to quality. As Stephen M. Berkley, chairman and CEO of disk-drive maker Quantum Corp. in Milpitas, Calif., says, "It is critical to go beyond flag waving. It is important to be a cheerleader at the kickoff, but after that you need to have substance." □

Power to the workers

Here's how forward thinking companies reap big quality gains by pushing more authority down the corporate ladder

By Peter Burrows

Norm Dulong, a traffic supervisor in the spare parts department of Eaton Corp's semiconductor equipment division, is visibly nervous. For the past 10 months, he and a team of co-workers have reduced past-due sales orders in his department by 292%—down to just one mistake per 13,000 chances—but that was the easy part. Now he has to present the results of the pilot program at the quarterly all-company meeting. The 12-year Eaton vet has never made a presentation in front of so many people before.

But it goes just fine. When he finishes, the 350 employees erupt in applause. He gets hearty pats on the back from management and even a "Just Do It" Nike t-shirt for his efforts. It's not hokey, not forced—just an apt response to hard work and results.

Dulong's experience is a living example of empowerment, an overused term for what happens when those on the lower rungs of the organizational chart are permitted to use their nuts-and-bolts expertise to improve the way companies work. The logic seems obvious—those who do the work know best how to improve it—but somehow U.S. executives are having to relearn the lesson. "It's not that I lacked confidence in my people before, but this has really opened my eyes to what people can do," says Peter Younger, Dulong's boss and general manager of the Beverly, Mass.-based plant. "I've known Norm for a long time, but to

tell you the truth I didn't know he had it in him."

Executives around the United States are finding out about the Norms who have been languishing unappreciated for years in their cubicles and workcells. With fierce global competition forcing U.S. electronics companies to improve the quality of their products and services, many forward-thinking companies have

struggled to find ways to employ all available brainpower to squeeze as much improvement out of their processes as possible. In fact, 76% of 511 CEOs surveyed by ELECTRONIC BUSINESS and Ernst & Young in 1990 named "employee involvement" the single best way to improve product quality.

THE RESULTS OF this trend are hard to quantify, but the rapid proliferation of employee-based quality teams—even at old-guard, tightly managed companies like IBM, Martin Marietta, and Texas Instruments—shows that the impact is explosive. Every employee at IBM's Baldrige-winning division in Rochester, Minn., is involved in at least one quality team each year, says spokesman Dick Ulland. Management at TI's Defense Systems and Electronics Group, one of this year's Baldrige finalists, wants every employee to be in a "self-directed workteam" by the end of 1992.

"We want our employees to just go out and do a lot of the stuff that we used to call 'management'—things like staffing and scheduling," says TI's William "Hank" Hayes, president of DSEG. "It's a new model for how to run a business, and it's totally transforming the way we organize our people and do our jobs."

This revolutionary thinking strikes at many U.S. electronics companies. Rather than view workers as a cost to be trimmed or expanded according to the business cycle, empowerment forces management to treat personnel as a strate-



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gie fixed asset worthy of consistent maintenance and investment. "The winners in the next few decades will be the companies with the most empowered work forces," says Michael Dell, CEO and president of Dell Computer Corp. in Austin.

TO KEEP UP in the race, managers must break with the paternalistic business philosophies they were taught in the business schools of the '50s, '60s, and early '70s. Rather than viewing themselves as practitioners of strategies and protectors of their people, they must look to their underlings for guidance—and spend their time creating an environment in which that expertise is shared and implemented. "It isn't enough to just be a good employer anymore," says Joanne McCree, personnel manager at IBM-Rochester. "You have to find ways to help people make as much of themselves as possible."

Fortunately, American workers appear to be waiting and willing for the chance to have a greater impact on the way their work is done. In an *ELECTRONIC BUSINESS* survey this summer, 138 CEOs named factory workers the group least resistant to quality programs within their companies (besides themselves, that is).

Then why haven't more companies been able to push decision-making down to the lower levels? Unfortunately, many U.S. companies suffer from a credibility gap when it comes to quality. "We've given employees plenty of reasons not to trust us in the past," notes John Gilbertson, a senior vice president at components maker AVX Corp. in Myrtle Beach, S.C. In the early '80s, for example, AVX tried to raise its quality the old-fashioned way—by calling in a guru and hanging flags on the walls. "These guys went around the place like policemen, writing tickets when things went wrong," says Gilbertson. "Looking back, we vastly under-



estimated our people."

After two frustrating years, AVX took a new tack. Employees received extensive job-specific training, were asked to form teams, and were then given lots of latitude to find and solve problems. Poor execution and cynicism kept progress slow at first, says Gilbertson, "but once they saw it wasn't a punitive system, they got excited."

Empowerment programs do not just go on cruise control once management has handed over the keys, however. They require vigilant maintenance. Companies such as Dell, HP, and IBM, use lengthy employee-satisfaction questionnaires to create action plans each year, and specially designated teams implement the

plans. National Semiconductor has a formal program to get 50 suggestions per year from every employee, up from the 20 suggestions per employee it receives now.

Enlightened companies are also finding new and diverse ways to reward top-drawer workers. CEO Dell sends a personal note to any employee who is mentioned in a positive light in letters from customers. Many companies hand out checks for \$100 or \$250 to top employees, often on the spot. Others hand out more lucrative bonuses. IBM-Rochester, for example, gives out \$2,000 per

team member to the top performing quality team each quarter.

But some of the most effective methods to motivate employees are the ones aimed at more than just the wallet—the employee's sense of

Norm Dulong (seated), a traffic manager at Eaton Corp.'s semiconductor equipment division, headed a team that reduced past-due sales orders in his department to almost zero. Says boss Peter Younger, "Empowerment has really opened my eyes to what people can do. . . . I didn't know he had it in him"

responsibility and self-worth. Many executives find that sharing sensitive financial and strategic data with employees at all-company meetings leads to a more interested work force and a rash of cost-cutting suggestions. Installation of closed-circuit TV systems or home delivery of in-house publications make people more informed and aware of the big picture. Friday afternoon keg parties can break down walls and improve morale. Letting production workers instead of salesmen give customer tours gives the worker a chance to get well-deserved credit—and gives the customer a more informed tour.

Such gestures can go a long way. Take Debbie Peterson, a PCB assembler at TI's DSEG plant. When management called a production break last year to announce the empowerment program, her first thought was "How

Empowerment around the world

Here's who top execs share corporate goals and plans with

	U.S.	Japan	Europe
Only upper managers	23.9%	11.3%	45.3%
Only managers	62.5	71.1	43.8
All employees	13.6	17.6	10.9

Source: Boston University School of Management survey

Don Bradley

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James Cook

Hewlett-Packard equipment operator Jeff Scharpe was recently asked to accompany his boss on a customer visit to help improve understanding of the customer's needs. "That meant a great deal to me," says Scharpe, "especially when he showed me some of our financials on the airplane. He treated me very much as his equal, and I don't get the feeling that employees at most other companies feel that way"

much more money do I get?" That quickly turned to fear. "I asked myself if I had the ability, or the time, to do what they were asking." Now, having added electrical assembly and board testing to her repertoire of skills in an employee-inspired tactic to improve time to market, she says she feels "prouder and smarter. I also work harder to know the product, because I know the finger's going to be pointed at me if I make a mistake."

Under empowerment, though, errors are not occasions for punishment or blame, but for objective analysis and further training. "People should not be afraid to make mistakes," says Phil Gamache, corporate quality assurance manager at Lifeline Systems Inc., a high-flying \$32 million manufacturer of personal response systems. "Change is an end in itself, and whether everything works the first time around is entirely irrelevant." To back up its claim, the company has publicly empowered any employee with customer contact to compensate the customer for any product or service not found to be totally satisfying.

Dell Computer, which has grown over 30% in the past calendar year despite the faltering growth of the PC market, provides another glimpse at the empowered company

of the future. CEO Dell had never worked for another company nor been to business school when he founded his mail-order business in 1984 at the age of 19. As a result, the company is remarkably free of the complex management structures of most older companies. Manufacturing staff sit in on R&D thinkfests. Technical support people send replacement units to disgruntled customers without a single sign-off from above. "What's the worst thing that can hap-

"The winners will be those with the most empowered work forces"

Dell Computer CEO Michael Dell

pen?" asks customer service director Laura McDonald. "You waste a little cash and make a customer happy."

But empowerment is not a blank check for employees; it must be tightly coupled with education and process control systems. Employees must be trained in formal statistical methods and TQM techniques, as well as in the communications and

team problem-solving skills necessary to work productively with others. "People must be 'enabled' as well as 'empowered' for this to work," says IBM's McCree.

Most critical of all, employees must be trained to design and work within robust processes so that performance and improvement can be accurately measured. Dell Com-

puter, for example, has a clear process by which technical reps are trained and a process by which they are empowered, not to mention a specific checklist of procedures to go through with the customer before ordering that replacement system. With such

processes in place, mistakes become fodder for continued improvement.

What's the down side to this humanistic view of employee relations? For the progressive businessperson, the answer is "none," say the pundits. With market windows shrinking and technology driving ahead, the fatal flaw is not to institutionalize change. Empowerment—not TQM, JIT, or SPC—is the buzzword that puts the "continuous" in continuous improvement. People, not management systems, have the ability to hunt out new areas for improvement.

For many companies, there has been no better time to make empowerment a reality. Most employees have been through some training in the past decade and have the basic tools to succeed, and tough economic times have put workers more in the mood to hold up their end. "This would never have worked 10 years ago," says Jeff Scharpe, an equipment operator with HP. "Most of us know what it's like to work for a unit that goes out of business. With two kids and a wife to support, I'm ready to do all I can to help the company." □

The art and science of customer surveys

Focus groups, mail surveys, telephone polls, and spying are some of the techniques the industry uses to gauge buyer satisfaction

By Valerie Rice

Electronics companies are happily infecting themselves with a new affliction these days—"customer mania." It seems almost weekly a computer company or component maker sends a questionnaire to its customers, commissions a third party to interview customers by telephone, or touts its customer-satisfaction rankings in newspaper advertising. Despite the millions of dollars being spent on mail and telephone surveys, focus groups, and other intelligence-gathering techniques, consultants and industry officials say the electronics industry is just beginning to understand how to measure customer satisfaction.

Most industry CEOs say an in-person visit with actual users is the best way to measure customer satisfaction. Moreover, few CEOs consider surveys and market research useful, according to a study released earlier this year of 550 executives by *ELECTRONIC BUSINESS* and the accounting firm Ernst & Young. It found 67% of the CEOs rate a "press-the-flesh" visit as the most useful method of measuring customer satisfaction, and only 25% regard surveys and market research as useful. "That may indicate either a lack of available systems or a lack of trust in market research methods to capture the voice of the customer," the report notes.

Nevertheless, surveys by leading industry companies are almost a routine event these days. Electronics companies view improved customer satisfaction as an important way to

increase revenue and reduce costs. Sound like a contradiction? Not really. "On average, an installed-base sale is five times more profitable than a new-business sale," explains Michael Moon, president of Gistics Inc., a Larkspur, Calif., consulting firm. "In fact, many new-business sales are actually not profitable."

Some companies contend they can correlate their customer satisfaction ratings with financial performance. IBM found each percentage point gain in its customer satisfaction scores meant an additional \$250 million in revenue over a five-year period, according to Greg Lea, program director of market driven qual-

ity at IBM's minicomputer plant in Rochester, Minn.

In addition, surveys produce important information about competitors and market conditions. Thom Edmonds, quality manager for Hewlett-Packard's worldwide customer support organization, says surveys offer a vital customer-side view of the competition, and Moon adds that companies can be formed from survey information.

A start-up could identify a target company and then buy a list of probable users of that company's product or service, Moon explains. A survey can identify heavy users of the target company's products and determine which elements of the competition's products and services are most valued. Then the new company could reverse engineer that information to see how the target company became successful. "If you interview 100 totally satisfied customers, you will end up with a clear model to apply statistical process control to, and then you can start your business model," he says.

Survey costs range from \$5,000 or \$10,000 for a simple mail survey of 1,000 customers to seven figures for a worldwide campaign. A focus group session, where a moderator elicits information about a product or company from a dozen or so customers while company officials listen and watch behind two-way mirrors, runs about \$3,700, including an honorarium and a modest meal for each participant, and includes a videotaped record. Overall, "a comprehensive, well-designed measurement pro-



A percentage point gain in customer satisfaction meant \$250 million in revenue over a five-year period, according to IBM's Greg Lea

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gram" for a hypothetical company with 500 employees and \$100 million in revenue would cost between \$50,000 and \$75,000, estimates Brian Lunde, director of business development with Walker CSM, an Indianapolis consulting firm.

Lunde's proposed program for that hypothetical company includes five steps. The first step is obvious but most difficult: to determine exactly what the company is trying to find out and to write the questionnaire for the interviewers. Contractors handle the second step, the actual distribution of the questionnaires, the telephone polling, or the focus groups. Steps three and four, data collection and analysis, are also provided by consultants and contractors who specialize in customer surveys. Careful planning of the fifth step—the action plan, or how the company will act on the results—is often overlooked. For a company with \$100 million in revenue, Lunde says the research program should take about three to four months. Projects for larger companies could take longer than six months and cost considerably more.

Hewlett-Packard is a big spender on surveys. An annual survey of 40,000 customers, initiated in 1988 and costing about \$700,000 to \$900,000, aims to learn more about their level of satisfaction with its service and support department, a \$2 billion-plus a year business. Another survey helps the company understand the competition and its customers better, according to quality manager Edmonds.

Lower-cost studies are available through a number of channels. Other third parties and market research firms such as Dataquest in San Jose offer syndicated user studies. J. D. Powers & Associates, a well-known monitor of the automobile industry, recently completed a customer satisfaction survey of PC users and

sold the information to the OEMs. Dell Computer Corp. in Houston turned Powers's results into an advertising campaign. Surveys and other research services are also available from trade and general business publishers.

Throwing bushels of money into a survey is not a guarantee that you'll receive valuable insights—careful consideration of the questions is also required. IBM's Lea says there are five key elements to a solid customer

please all of the people all of the time. Highly rated vendors say 5% to 10% of a survey group will never be satisfied, no matter what you do or say. IBM's AS/400 minicomputer line won a Baldrige National Quality Award last year and is considered a tremendous business success for IBM as well, but its overall customer satisfaction rating is only in the "low '90s," percentage-wise, according to quality manager Lea, who hastens to add that the current number is the highest the system has ever received.

Informal customer surveys provide an education as well. They function as an extremely valuable early-warning system to alert managers to their weaknesses in the market. Random telephone spot-checks and other techniques may not offer a comprehensive and statistically significant perspective, but what they lack in quantitative insights they more than compensate for with qualitative lessons. Managers from Dell, HP, Sun Microsystems,

and others frequently contact customers by telephone to follow-up on work done by consultants and research firms.

Sun also has some unusual approaches to gathering information about customer satisfaction. Executives take turns in a "listening booth" at trade shows to learn more about customer views of the company and its products, according to Cindy Williams, who is in charge of worldwide customer support marketing programs. Workstation vendors call every new customer to monitor customer sentiment within the first three months of a purchase. Data from these and other efforts are added to the company's historical database, enabling the company to track changes in buyers' needs and perceptions.

Ten years ago focus groups were rarely used by the electronics industry, but no more. These groups are

Which techniques best measure customer satisfaction?

(% of 550 electronics industry CEOs who rated a technique as useful)

In-person visits to actual user of product	67%
Interaction with upper management of customer	50
Customer service tracking system	27
Periodic surveys/market research	25
Field audits	21
External general market assessments	12

Source: "Electronics 91: Framework for the Future," by ELECTRONIC BUSINESS and Ernst & Young

survey. The questionnaire or interview should begin with general, administrative-type questions: How hard is it to do business? What is the most irritating thing? Other topics to be included are marketing, product technology, delivery, and service.

Asking the right questions, and understanding the answers, are more challenging than you might think. Customers' perceptions of prompt service vary from industry to industry and from product to product. A one-hour on-site repair service may be considered the minimum for a bank that is nursing sick automated teller machines on holiday weekends, but four-hours may be satisfactory for an accounting department responsible for a monthly general ledger report.

Any industry official who expects to score 100% in a customer satisfaction poll is dreaming—you can't

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increasingly being used as a tool to improve customer service, in addition to their role in product development and testing. Companies such as Lotus Development Corp. use videotapes of the discussions to provide insights to company employees who are unable to attend. Sun Microsystems instituted a focus group program four years ago, called the "Voice of the Customer," to hear from about 50 corporate workstation buyers periodically on a variety of topics such as support issues. Sun instituted programs to give higher priority to support as a result of the feedback, Williams says.

Tracking incoming complaints and their resolution is another low-cost and statistically questionable method of tracking customer satisfaction. Sun recently began tracking customer complaint letters to determine weaknesses or patterns of satisfaction, as well as to make sure the complaints are answered. The quantitative measure is response time—how fast the customer support staff contacts the complainant and solves the problem.

The plethora of customer surveys and benchmarking by OEMs also provides suppliers with valuable data. National Semiconductor Corp. in Santa Clara, Calif., is a big fan of surveys done by its large customers. They evaluate National based on service, delivery, and performance. National receives scorecards that not only indicate its strengths and weaknesses, but points to those of its competitors as well, says Tim Thorsteinson, director of quality performance. "We focus our activities on the score-

Customer satisfaction survey checklist

Five key elements are necessary for a solid customer survey, according to the folks at IBM who won a Malcolm Baldrige National Quality Award last year for their AS/400 minicomputer

Element	Typical questions
Administrative	How hard is it to do business with us? What is the most irritating thing?
Marketing	Which channel of distribution do you use? How professional are we?
Product technology	How reliable are our products? What features are important? Is the company delivering the right solution?
Delivery	Was the equipment delivered on time? Was anything missing? Was anything damaged?
Service	How responsive are we to your complaints?

Source: "Electronics 91: Framework for the Future,"
by ELECTRONIC BUSINESS and Ernst & Young

cards of the most sophisticated customers," he explains. "That way we can improve performance across the entire customer base."

National's customers were mostly concerned with prompt and consistent deliveries in past surveys, so National recently adopted new systems to ensure on-time arrival of products, according to Thorsteinson. In 1990 its scores on customer service were so weak that the company recently began customer-service training under the tutelage of now-retired president Charlie Sporck.

Unlike National Semiconductor, some electronics companies are simply indifferent to customer satisfaction surveys by third-parties. Dan Hutcheson, president of VLSI Research Inc., a market research firm in San Jose, says that Japanese companies are more interested in customer satisfaction survey data than U.S. companies. "When we release a survey, we get calls from Japanese companies," Hutcheson says. "If they are numbers three, four, or five on the list of the top 10, they want to know how to become number one.

They want to respond immediately. Americans are just happy to get on the top 10 list—and they think of it as an advertising opportunity," even if they didn't reach the top of the list.

Smart companies these days are ready, willing, able, and indeed eager to receive customer feedback from any source. Several years ago Hutcheson's survey found one company that had a terrible reputation because part of its machine melted during the manufacturing process. Hutcheson went to the company and alerted top managers to the problem. Incredibly, they claimed ignorance of the product fiasco. The supplier began a crash program to fix the equipment, "mothering" its customers with attention. "By the next survey a year later, the vendor was in the top 10 in customer satisfaction ratings," Hutcheson says.

For a company to be unaware of a major problem until receiving an alert from the outside is symbolic of the electronics industry's embryonic approach to measuring customer satisfaction. In part the industry's ignorance is due to its relative immaturity—it took the automobile industry 80 years and an invasion from overseas vendors before customer service became a major rallying cry. In addition, some electronics industry executives remain unconvinced of the importance of measuring customer satisfaction. "Customer satisfaction just does not compute in the traditional business model," contends consultant Moon. "Executives must conceptually re-think the base assumptions upon which their company is founded." □